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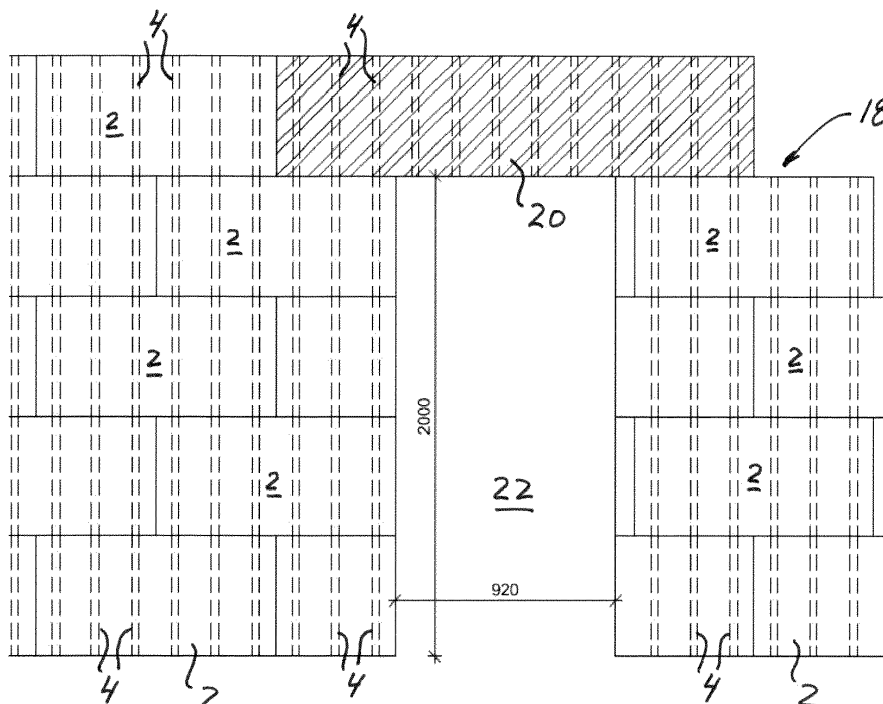
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(54) BUILDING BLOCK SYSTEM

(57) A building block system including block-shaped building elements (2, 10, 14) for erecting inner, outer and partitioning walls (18, 24), in particular for one-storey houses, wherein the block-shaped building elements (2, 10, 14) are designed with a system of internal ducts (4) that with the object of carrying technical installations, e.g. electric installations and/or plumbing installations, are arranged for connection with a corresponding system of

internal ducts (4) of adjacent block-shaped building elements (2, 10, 14). In a very simple way it is hereby possible to achieve a substantially reduced building time, to achieve appreciably wider applications and to achieve entirely new building-construction advantages when erecting bearing inner, outer and partitioning walls (18, 24), in particular in single-storey houses.

**Fig. 13**

Description

Field of the Invention

[0001] The present invention concerns a building block system of the kind indicated in the preamble of claim 1.

Background of the Invention

[0002] It is prior art to use block-shaped building elements for erecting inner, outer and partitioning walls in buildings, in particular single-storey houses. For erecting bearing inner walls and partitionings it has e.g. been common to use relatively light building elements with a suitable height x width of e.g. 2500 x 600 mm; such building elements of room height are known, e.g. under the trade name Siporex®, which with a thickness of 100 mm have good bearing capability and reasonable good barrier properties.

[0003] US 6282853 discloses a modular building block system with ducts for coupling transverse struts that reinforce the structure. The problem of US 6282853 is that for possible hidden carrying of the struts a completely different set of ducts are to be made. Since not all elements are capable of carrying electric installations and/or plumbing installations, there are a number of extra requirements since it is to be known precisely in beforehand where electric outlets or water is wanted. This increases the risk of errors, causing the building process to be slower.

[0004] US 2006156656 discloses a modular building block system with ducts for hidden carrying of electric ducts and/or plumbing installations. US 2006156656 uses large cavities in the structure, impacting the strength negatively. Besides, the invention disclosed in US 2006156656 cannot be used for connecting two mutually rectangular walls as the ducts are too large. In addition, the wide ducts prevent a mason from making adjustments of the block itself as the block can only be divided at one point.

Object of the Invention

[0005] It is the object of the present invention to indicate a new and improved building block system which in a simple way enables enhanced application of known building methods and which opens for appreciably broader applications and for achieving entirely new constructional advantages when erecting bearing inner, outer and partitioning walls, in particular in single-storey houses.

Description of the Invention

[0006] A building block system for erecting inner, outer and partitioning walls. The building block system consists of block-shaped building elements that each having a length along a longitudinal axis, a height along a height axis and a width along a width axis. The three axes are

mutually orthogonal.

[0007] The building block system according to the invention is peculiar in that the block-shaped building elements are designed with a system of internal ducts which with the object of carrying technical installations, e.g. electric installations and/or plumbing installations, are arranged for connection with a corresponding system of internal ducts of adjacent block-shaped building elements.

[0008] In a very simple way it is hereby possible to achieve a substantially reduced building time, to achieve appreciably broader applications and to achieve entirely new constructional advantages when erecting bearing inner, outer and partitioning walls, in particular in single-storey houses.

[0009] In an advantageous embodiment the vertical ducts are disposed such that the spacing to other vertical ducts in the building block system is a multiple of a first duct spacing, where the length of the building element is a multiple integer of the first duct spacing.

[0010] The advantage that the length of the building element depends on the first duct spacing and not the opposite is that one may build a wall with building elements having different lengths without caring about whether all ducts are overlapping. The mason is only to check one duct, and then he will know that the remaining ducts overlap. This reduces complexity, meaning increasing the speed at which a wall can be erected.

[0011] In yet an advantageous embodiment, the two ends of the building element along the longitudinal axis have a first end spacing to the nearest vertical duct which is half an uneven number times the first duct spacing.

[0012] It is hereby possible to have vertical duct by any multiple of the first duct spacing. This will drastically reduce complexity, enabling the mason to build faster and with fewer errors.

[0013] In addition, it is cheaper to produce and build with building elements that can be used in any case compared with building elements for special purposes.

[0014] With the object of easy establishment of a system of vertical installation ducts, the building block system according to the invention may advantageously be designed such that the block-shaped building elements for erecting inner walls and/or partitioning walls are constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a short side edge.

[0015] The prefabricated vertical duct system in the building blocks may thereby advantageously be used for carrying hidden electric installations where it will be very simple to incorporate and connect installation boxes in inner and/or outer walls, the said installation boxes being connected with the internal duct system in the building block system according to the invention.

[0016] Alternatively, with the object of facilitating establishment of horizontal installation ducts, the building block system according to the invention can be designed

such that the block-shaped building elements for erecting inner walls and/or partitioning walls is constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a long side edge.

[0017] In another advantageous embodiment, the horizontal ducts in the building block system are disposed such that the spacing to other horizontal ducts is a multiple of a second duct spacing, where the height of the building elements is a multiple integer of the second duct spacing.

[0018] The advantage that the length of the building element depends on the second duct spacing and not the opposite is that one may build a wall with building elements having different height without caring about whether all ducts are overlapping. The mason is only to check one duct, and then he will know that the remaining ducts overlap. This reduces complexity, thereby increasing the speed at which a wall can be erected.

[0019] In yet an advantageous embodiment, the two ends of the building element along the height axis have a second end spacing to the nearest horizontal duct which is half an uneven number times the second duct spacing.

[0020] It is hereby possible to have a horizontal duct at any multiple of the second duct spacing. This will drastically reduce complexity, enabling the mason to build faster and with fewer errors.

[0021] In addition, it is cheaper to produce and build with building elements that can be used in any case compared with building elements for special purposes.

[0022] Besides, it is also easier to install the line after e.g. ten years since it can be calculated from the first and the second duct spacing where the vertical or horizontal ducts are located. I.e. it is known where to drill a hole in the wall.

[0023] Such a prefabricated system of horizontal ducts, e.g. in special wall sections of a house built of building blocks according to the invention, may advantageously be used for hidden carrying of plumbing installations.

[0024] Irrespective of the mutual orientation of the system of internal ducts, by the building block system according to the invention it may be advantageous that the system of internal ducts of the modular block-shaped building elements are mutually offset in such a modular way that the ducts still can be connected with each other, for example by a mutually modular displacement.

[0025] The pace of constructing a building can thereby be increased as the masons know that the internal ducts will overlap.

[0026] In an advantageous embodiment, the system of internal ducts consists exclusively of a vertical group consisting of one or more vertical ducts. The horizontal ducts are primarily used for hidden carrying of plumbing installations, and in case that an area of the building is without water the horizontal ducts will be redundant.

[0027] In an advantageous embodiment, the system of internal ducts consists exclusively of a horizontal group consisting of one or more horizontal ducts. The vertical ducts are primarily used for hidden carrying of electric wiring, and since there is no use for electricity in a bath, the vertical ducts are redundant.

[0028] The building block system according to the invention may suitably be designed such that the block-shaped building elements for erecting outer walls are constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a short side edge, the block-shaped building elements also being connected with an external complementary insulating block with a thickness of e.g. about 310 mm.

[0029] Alternatively, the building block system according to the invention may suitably be designed such that the block-shaped building elements for erecting outer walls are constituted by modular block-shaped building elements with a height/length/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a long side edge, the block-shaped building elements also being connected with an external complementary insulating block with a thickness of e.g. about 310 mm.

[0030] In a modified embodiment, the building block system according to the invention may be designed such that the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a short side edge, the block-shaped building elements also being connected with an interposed complementary insulating block with a thickness of e.g. about 310 mm.

[0031] Or, cf. a further embodiment, the building block system according to the invention may be designed such that the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements with a height/length/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a long side edge, the block-shaped building elements also being connected with an interposed complementary insulating block with a thickness of e.g. about 310 mm.

[0032] With the object of achieving an extended advantageous function of a building block system according to the invention, this may advantageously include connecting means for transmitting tensile forces from a building foundation to a head of a roof construction, where the carrying of the force transmitting connection means may be effected in a particularly advantageous way through the system of internal vertical ducts.

[0033] The strength of the building block system is increased in a simple way.

[0034] For erecting inner, outer and/or partitioning walls, the building block system according to the inven-

tion may furthermore include building blocks with greater length, for example with double length of 2000 mm, which can be used as lintels over door and window openings.

Description of the Drawing

[0035] The invention is explained more closely in the following with reference to the drawing, on which:

- Fig. 1 shows a perspective view of an embodiment of building block for a building block system according to the invention;
- Fig. 2 shows a plan view of the building block, cf. Fig. 1, as seen from a short side edge;
- Fig. 3 shows a plan view of the building block, cf. Fig. 1, as seen from a long side;
- Fig. 4 shows a plan view of the building block, cf. Fig. 1, as seen from a long side edge;
- Fig. 5 shows a perspective view of another embodiment of building block for the building block system according to the invention;
- Fig. 6 shows a plan view of the building block, cf. Fig. 5, as seen from a short side edge;
- Fig. 7 shows a plan view of the building block, cf. Fig. 5, as seen from a long side;
- Fig. 8 shows a plan view of the building block, cf. Fig. 5, as seen from a long side edge;
- Fig. 9 shows a perspective view of a further embodiment of a building block for a building block system according to the invention;
- Fig. 10 shows a plan view of the building block, cf. Fig. 9, as seen from a short side edge;
- Fig. 11 shows a plan view of the building block, cf. Fig. 9, as seen from a long side;
- Fig. 12 shows a plan view of the building block, cf. Fig. 9, as seen from a long side edge;
- Fig. 13 shows a plan view for illustrating erection of a wall with breaking joint with a door opening and with interconnected vertical ducts in the individual building blocks;
- Fig. 14 shows a perspective view for illustrating a double outer wall erected with breaking joint by means of the building block system according to the invention;

Fig. 15 shows a perspective view of an embodiment of an anchoring detail of the building block system according to the invention;

5 Fig. 16 shows a perspective view of an embodiment of a further anchoring detail of the building block system according to the invention;

Fig. 17 is a perspective view showing how a recess for an electric installation box is drilled by a cup drill opposite a vertical installation duct of the building block system according to the invention;

15 Fig. 18 is a perspective view showing how an electric installation box is fastened in the recess, cf. Fig. 15, opposite a vertical installation duct of the building block system according to the invention; and

20 Fig. 19 shows a perspective view for illustrating insertion of a flexible installation tube in a vertical installation duct opening through a beam head in the attic of a building.

Detailed Description of Embodiments of the Invention

[0036] Fig. 1-4 show a first embodiment of a building block 2 intended for erecting bearing inner walls and partitioning walls. The building block 2 has e.g. a length/height/thickness of 1000/500/100, corresponding to a normal room height of about 2500 mm requiring a normal breaking joint in height consisting of up to five building blocks 2.

35 **[0037]** Each of the building blocks 2 are distributed over a long side edge 6 provided with six vertical ducts 4 with circular cross-section as the spacing between centres of the ducts 4 is about 166.7 mm whereas the spacing between opposing short side edges 8 and the centres of the outermost ducts 4 constitutes about half thereof, namely about 83.3 mm.

[0038] Figs. 5-8 show a second embodiment of a building block 10 consisting of a building block 2, cf. Figs. 1-4, externally provided with a complementarily formed insulation block 12 with a thickness of about 310 mm. The building block 10 is intended for erecting insulated outer walls.

50 **[0039]** Figs. 9-12 show a third embodiment of a building block 14 consisting of two building blocks 2 between which is fastened a complementarily shaped insulation block 16 such that the total thickness of the building block 14 is e.g. $2 \times 100 + 310$ mm, i.e. a total thickness of 510 mm. The building block 14 is intended for erecting insulated outer walls.

55 **[0040]** In order to explain the principle of the invention with the described interconnected ducts 4, reference is made to Fig. 13 showing how e.g. an inner partitioning

wall 18 is constructed of a number of building blocks 2 and of a longer, possible reinforced block-shaped lintel 20 - e.g. with a double length of about 2000 mm - for establishing door and/or window openings 22.

[0041] Moreover, Fig. 13 shows how the breaking joint between respective layers of building blocks 2 is arranged such that the vertical ducts 4 are aligned with each other in respective layers of building blocks 2.

[0042] In addition, reference is made to Fig. 14 showing how an outer walls 24 consisting of building blocks 14 are constructed with breaking joint.

[0043] Fig. 15 shows a very special reinforcing system 26 with a strong reinforcement bar 28 which at an end part 30 is connected with an upright threaded sleeve 32 adapted for receiving a lower threaded end of one or more connecting rods 34 running up through the ducts 4, and which by means of a nut 36, cf. Fig. 16, is fastened to a top side of a head 38 of a roof construction.

[0044] Fig. 17 illustrates how a recess 42 can be drilled by means of a cup drill 40 - opposite a vertical duct 4 - in which recess an installation box 44 can be fitted, cf. Fig. 18. Finally, Fig. 19 shows how a flexible electric installation tube 46 can be passed down into one of the vertical ducts 4 through an upper opening 48 in the head 38.

[0045] It is to be noted that respective building blocks in principle can be designed with a system of mutually parallel ducts which, as described, can extend vertically in parallel with short side edges of the building blocks, i.e. with a vertical extension between long side edges.

[0046] Alternatively, building blocks of the inventive building block system as indicated by the claims being designed with parallel ducts extending horizontally between the short side or long side edges of the building blocks. Such building blocks can e.g. be used for building inner walls along kitchen and wet rooms so that plumbing installations can be carried hidden through the horizontal ducts.

[0047] Building blocks for the building block system according to the invention may in principle be designed with an internal system of both vertical and horizontal ducts.

[0048] Moreover, it is to be noted that it is of utmost importance that application of concrete adhesive or similar adhesive for connecting the building blocks is performed in a way whereby it is ensured that the internal ducts are not filled with concrete adhesive.

[0049] It will also fall within the main aspect of the invention to use a kind of connecting bushes - possibly with an external central collar - which can be placed in selected ducts with the intention of fixing the building blocks in mutual correct position, i.e. such that the connection between the vertical ducts is intact.

[0050] In special cases, the vertical ducts may - e.g. where excessive wind load or other kind of extra load on a certain wall part is expected - be filled with a thin concrete mixture such that an entirely local internal reinforcement is established in order to provide strength to the wall part in question.

[0051] Such an extra local reinforcement of a wall part can alternatively be established by inserting strong reinforcement bars in selected ones of the internal ducts 4 in the building blocks 2, 10, 14.

Reference numbers in the drawing

[0052]

2	first building block
3	ducts
4	vertical ducts
5	horizontal ducts
6	short side edge
8	long side edge
10	second building block
12	externally insulated building block
14	third building block
16	intermediate insulation block
18	partitioning wall
20	lintel
22	door and/or window opening
24	outer wall
26	reinforcement system
28	strong reinforcement bar
30	end part
32	threaded sleeve
34	connection rods
36	nut
38	head
40	cup drill
42	recess
44	installation box
46	flexible installation tube
48	upper opening

Examples

[0053] Example 1. A building block system including block-shaped building elements (2, 10, 14) for erecting inner, outer and partitioning walls, in particular for single-storey houses, wherein the block-shaped building elements (2, 10, 14) are designed with a system of internal ducts (4) that with the object of carrying technical installations, e.g. electric installations and/or plumbing installations, are arranged for connection with a corresponding system of internal ducts (4) of adjacent block-shaped building elements (2, 10, 14).

[0054] Example 2. A building block system according to Example 1, wherein the block-shaped building elements for erecting inner walls and/or partitioning walls are constituted by modular block-shaped building elements (2) with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6).

[0055] Example 3. A building block system according to Example 1, wherein the block-shaped building ele-

ments for erecting inner walls and/or partitioning walls is constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a long side edge.

[0056] Example 4. A building block system according to Examples 1-3, wherein the system of internal ducts of the modular block-shaped building elements (2, 10, 14) are mutually offset in a modular way such that the ducts (4) still can be connected with each other for example by a mutually modular displacement.

[0057] Example 5. A building block system according to Example 1, wherein the block-shaped building elements (10) for erecting outer walls are constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6), the block-shaped building elements (10) also being connected with an external complementary insulating block (12) with a thickness of e.g. about 310 mm.

[0058] Example 6. A building block system according to Example 1, wherein the block-shaped building elements for erecting outer walls are constituted by modular block-shaped building elements with a height/length/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (6) extending in parallel with a long side edge, the block-shaped building elements also being connected with an external complementary insulating block (10) with a thickness of e.g. about 310 mm.

[0059] Example 7. A building block system according to Example 1, wherein the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements (14) with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6), the block-shaped building elements also being connected with an interposed complementary insulating block (16) with a thickness of e.g. about 310 mm.

[0060] Example 8. A building block system according to Example 1, wherein the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements with a height/length/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a long side edge, the block-shaped building elements also being connected with an interposed complementary insulating block (16) with a thickness of e.g. about 310 mm.

[0061] Example 9. A building block system according to Example 1 and including connecting means (34) for transmitting tensile forces from a reinforcement (26) of a building foundation to a head (38) of a roof construction, wherein the carrying of the force-transmitting connection means (34) occurs through the system of internal ducts (4).

[0062] Example 10. A building block system according to Example 1, including building blocks with greater length, for example with double length of 2000 mm, which can be used as lintels (20) over door and window openings (22).

Claims

1. A building block system including block-shaped building elements for erecting inner, outer and partitioning walls, in particular for single-storey houses, wherein the block-shaped building elements have a length along a longitudinal axis, a height along a height axis and a width along a width axis, **characterised in that** the block-shaped building elements are designed with a system of internal ducts (3) which with the object of carrying technical installations, e.g. electric installations and/or plumbing installations, are arranged for connection with a corresponding system of internal ducts (3) of adjacent block-shaped building elements.
2. A building block system according to claim 1, **characterised in that** the vertical ducts (4) are disposed such that the spacing to other vertical ducts in the building block system is a multiple of a first duct spacing, where the length of the building element is a multiple integer of the first duct spacing.
3. A building block system according to claim 1 and 2, **characterised in that** the two ends of the building element along the longitudinal axis have a first end spacing to the nearest vertical duct which is half an uneven number times the first duct spacing.
4. A building block system according to one or more preceding claims, **characterised in that** the horizontal ducts (5) are disposed such that the spacing to other horizontal ducts in the building block system is a multiple of a second duct spacing, where the height of the building elements is a multiple integer of the second duct spacing.
5. A building block system according to claim 1 and 4, **characterised in that** the two ends of the building element along the height axis have a second end spacing to the nearest horizontal duct which is half an uneven number times the second duct spacing.
6. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements for erecting inner walls and/or partitioning walls is constituted by modular block-shaped building elements (2) with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6).

7. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements for erecting inner walls and/or partitioning walls is constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts extending in parallel with a long side edge. 5
8. A building block system according to one or more preceding claims, **characterised in that** the system of internal ducts of the modular block-shaped building elements are mutually offset in a modular way such that the ducts (4) can be connected with each other for example by a mutually modular displacement. 10
9. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements (10) for erecting outer walls are constituted by modular block-shaped building elements with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6), the block-shaped building elements (10) also being connected with an external complementary insulating block (12) with a thickness of e.g. about 310 mm. 15
10. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements for erecting outer walls are constituted by modular block-shaped building elements with a height/length/ thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (6) extending in parallel with a long side edge, the block-shaped building elements also being connected with an external complementary insulating block (10) with a thickness of e.g. about 310 mm. 20
11. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements (14) with a length/height/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a short side edge (6), the block-shaped building elements also being connected with an interposed complementary insulating block (16) with a thickness of e.g. about 310 mm. 25
12. A building block system according to one or more preceding claims, **characterised in that** the block-shaped building elements for erecting outer walls are constituted by outer and inner modular block-shaped building elements with a height/length/thickness of about 1000/500/100 mm, and with a number of mutually parallel internal ducts (4) extending in parallel with a long side edge, the block-shaped building elements also being connected with an interposed complementary insulating block (16) with a thickness of e.g. about 310 mm. 30
13. A building block system according to one or more preceding claims and including connecting means (34) for transmitting tensile forces from a reinforcement (26) of a building foundation to a head (38) of a roof construction, **characterised in that** the carrying of the force-transmitting connection means (34) occurs through the system of internal ducts (4). 35
14. A building block system according to one or more preceding claims, **characterised by** including building blocks with greater length, for example with double length of 2000 mm, which can be used as lintels (20) over door and window openings (22). 40

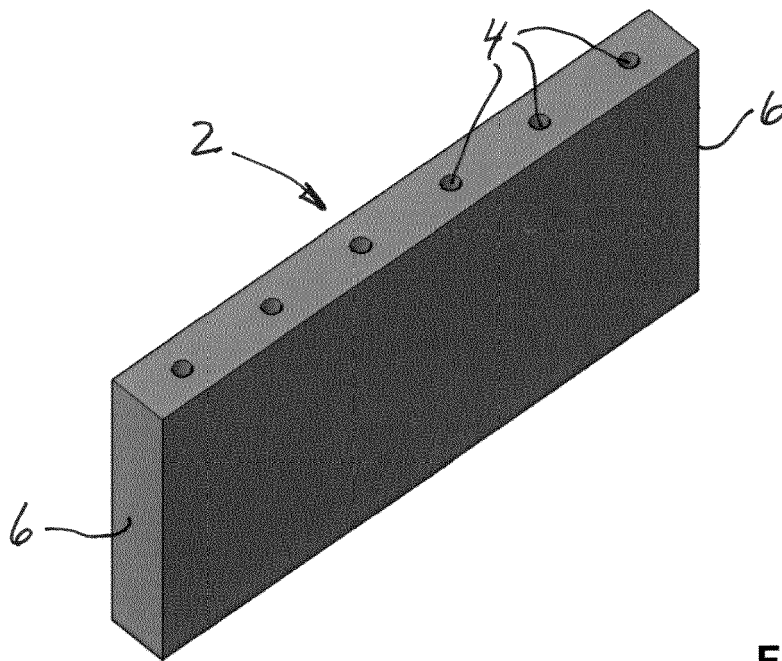


Fig. 1

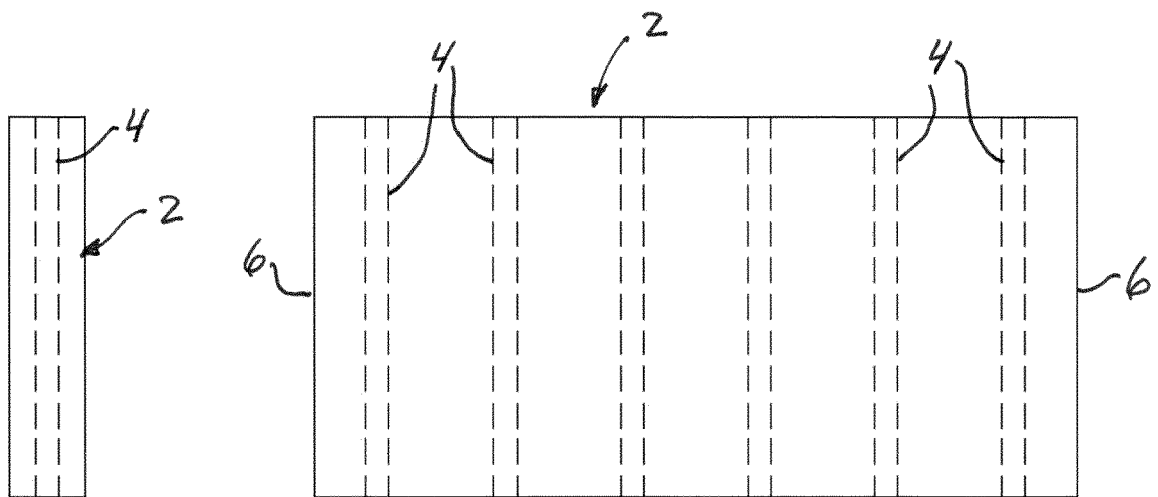


Fig. 2

Fig. 3

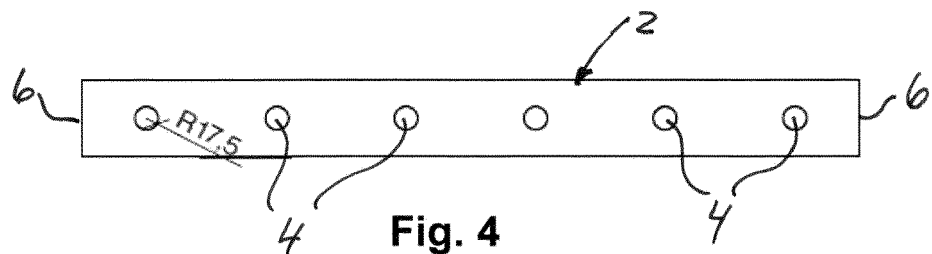


Fig. 4

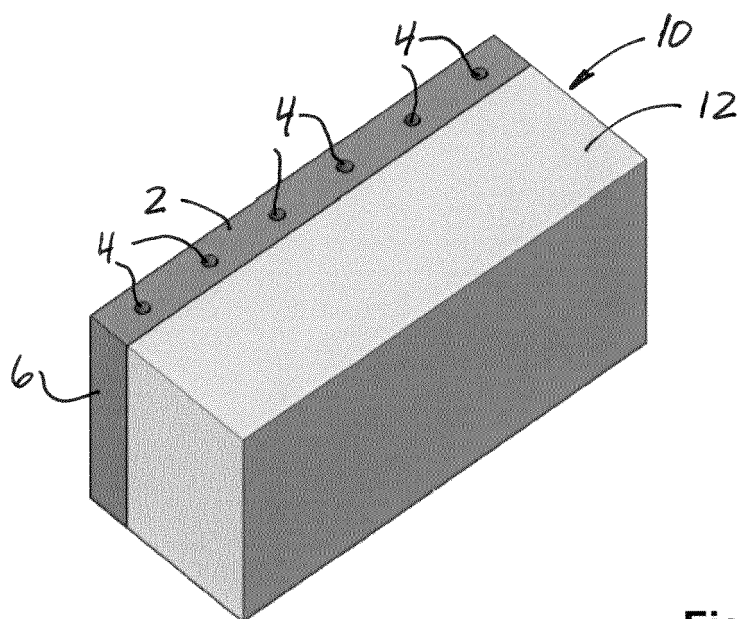


Fig. 5

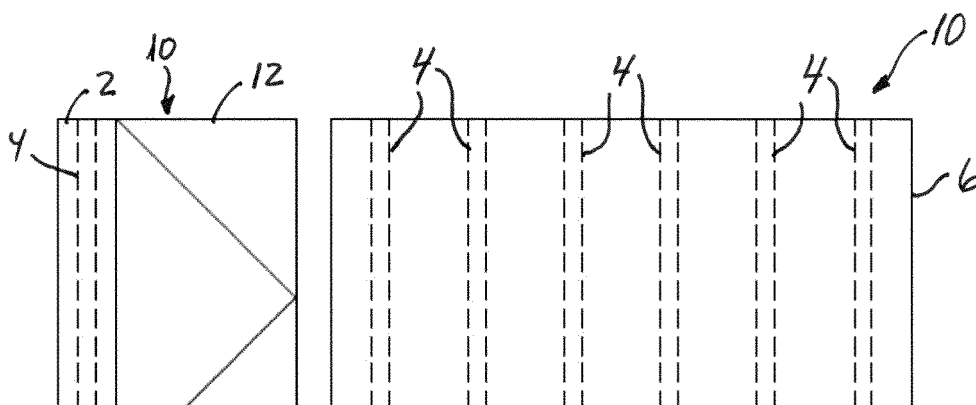


Fig. 6

Fig. 7

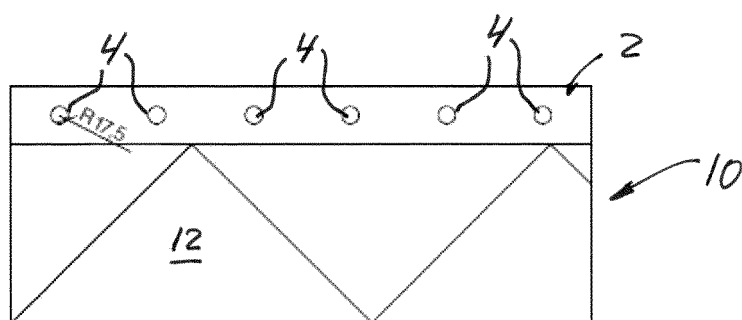


Fig. 8

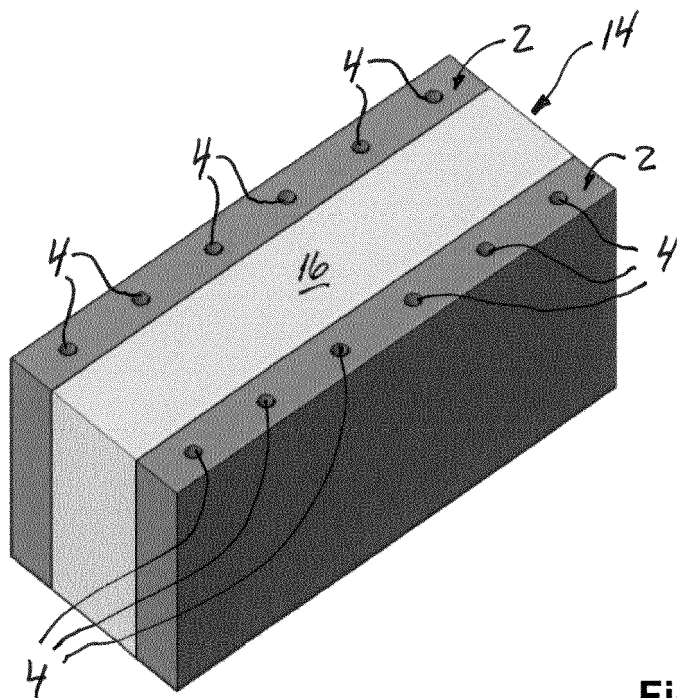


Fig. 9

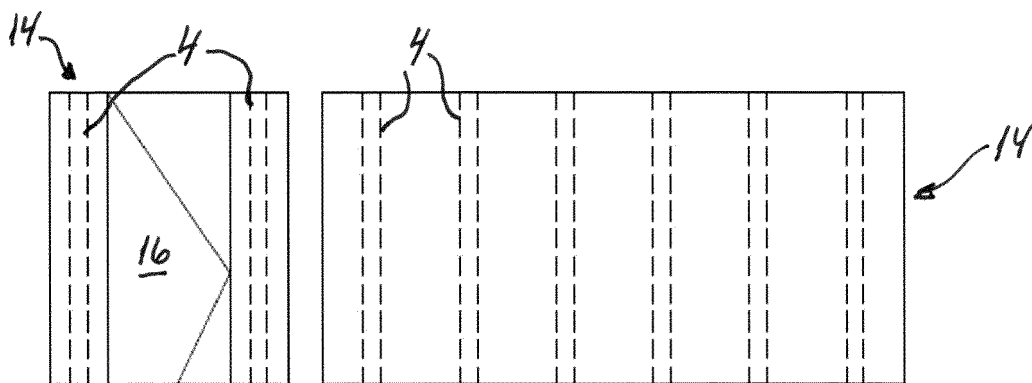


Fig. 10

Fig. 11

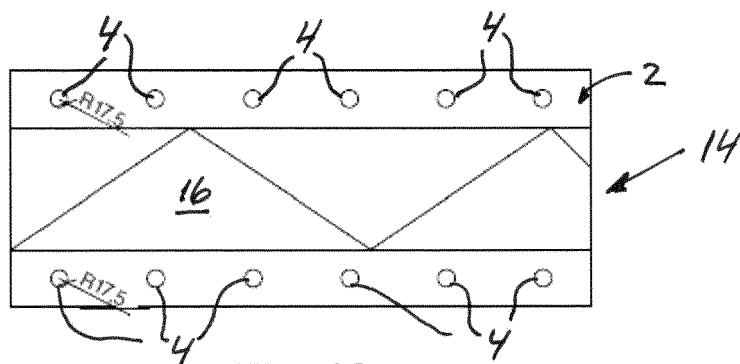


Fig. 12

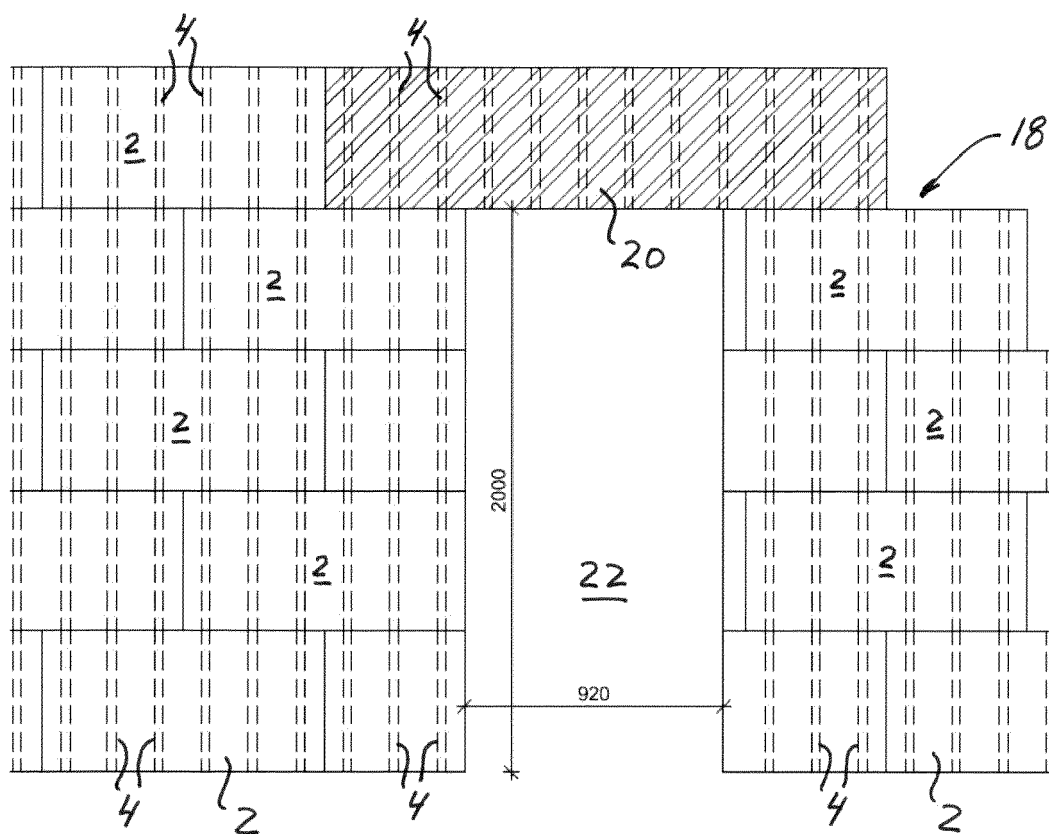


Fig. 13

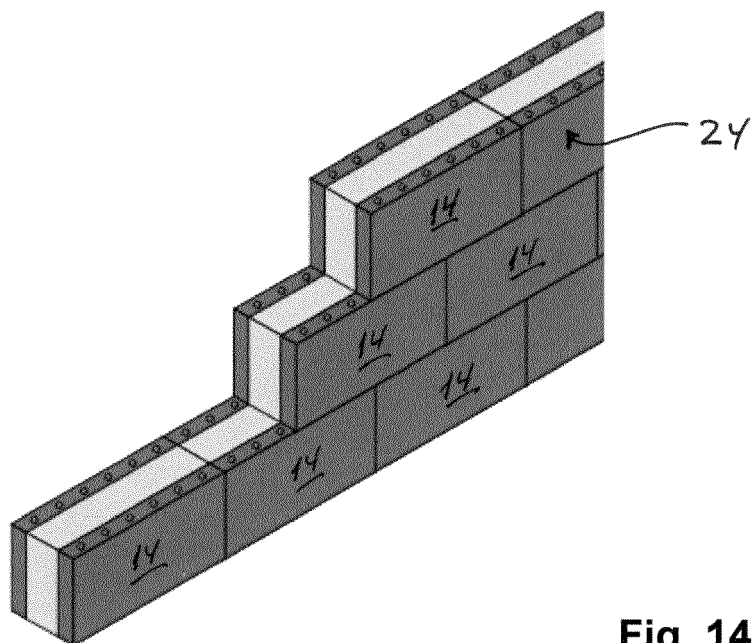


Fig. 14

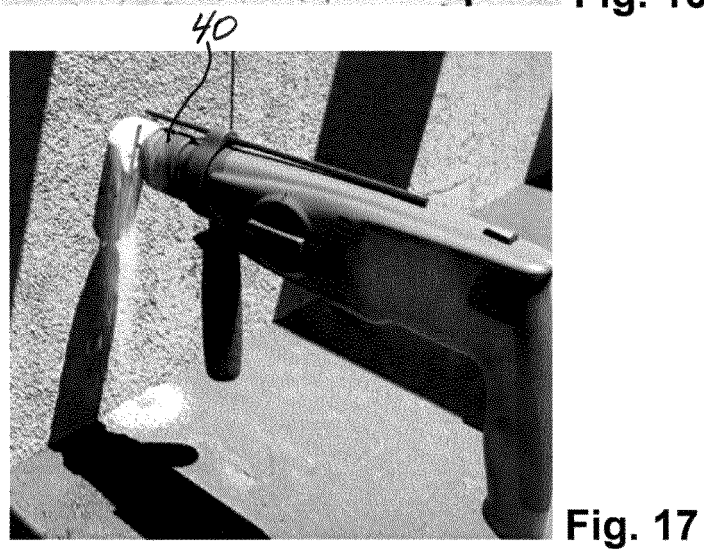
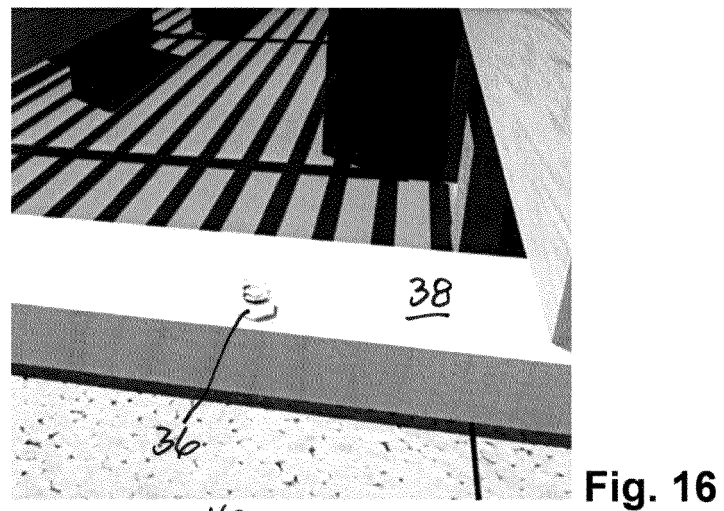
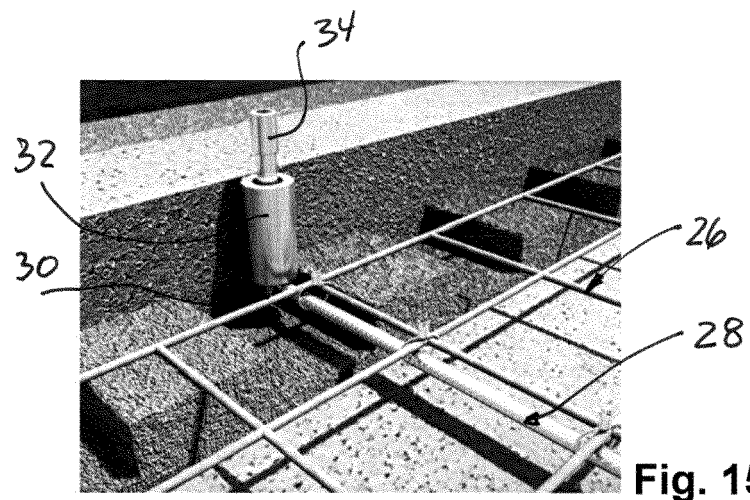




Fig. 18

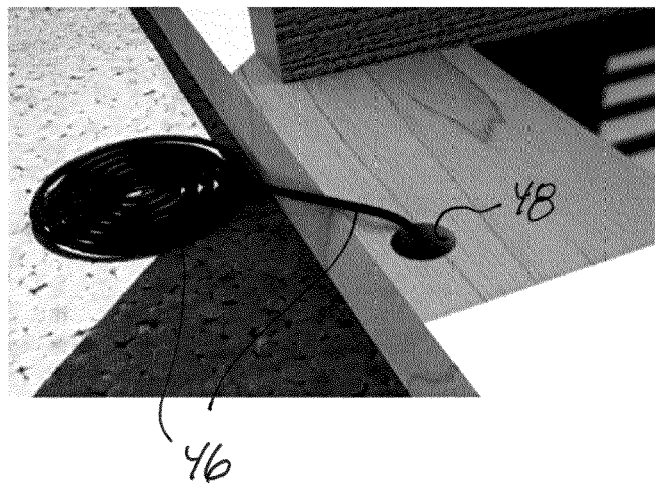


Fig. 19



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